IN THE CLAIMS:

A complete listing of all claims is now presented.

Claim 1. (Cancelled)

Claim 2. (Cancelled)

Claim 3. (Currently amended)

The method according to claim 19,

wherein the exchange of the catalysts or the variation of

the amount of mass or exchange and variation in ~~the portions (d),~~

~~(g), and (j)~~ step (c) are carried out by means of a numerical

random-check generator.

Claim 4. (Original)

The method according to claim 3,

wherein the program codes G05CAF, G05DYF, G05DZF and G05CCF

of the NAG Library (NAG FORTRAN Workstation Library, NAG Group

Ltd., 1986) of a numerical random-check generator are used.

Claim 5. (Previously presented)

The method according to claim 19,

where the number n_1 varying in their quantitative composition or chemical composition or quantitative and chemical composition ranges from 5 to 100.

Claim 6. (Previously presented)

The method according to claim 19,

where the selection number n_2, n_3 or n_{n+1} measures 5 to 30% of the number n_1.

Claim 7. (Previously presented)

The method according to claim 19,

wherein the main components are selected from the group comprised of Mg, Ca, Sr, Ba, Y, La, Ti, Zr, V, Nb, Cr, Mn, Tc, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, B, Al, Ga, In, C, Si, Sn, Pb, N, P, As, Sb, Bi, S, Se, Te, F, Cl, Ce and Nd.

Claim 8. (Previously presented)

The method according to claim 19,

wherein the mole fractions $b_1 .. b_j$ range from 0 to 50 mole-%.

Claim 9. (Previously presented)

The method according to claim 19,

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wherein catalyst mixtures are prepared by mixing salt solutions of the elements of the components $A^1 .. A^i$, $B^1 .. B^j$, $D^1 .. D^k$ and $T^1 .. T^1$ followed by thermal treatment in the presence of a reactive or inert gas phase (tempering) or by jointly precipitating of sparingly soluble compounds followed by tempering or exposing support component $T^1 .. T^1$ to salt solutions or gaseous compounds of the components $A^1 .. A^i$, $B^1 .. B^j$, $D^1 .. D^k$ followed by tempering,

wherein the employed salts are nitrates, sulfates, phosphates, carbonates, halogenides, oxalates, carboxylates, or mixtures thereof or carbonyl compounds or as acetyl acetonates.

Claim 10. (Previously presented)

The method according to claim 19,

wherein the catalytic reaction is carried out with liquid, evaporated, or gaseous reactants.

Claim 11. (Previously presented)

The method according to claim 19,

wherein the reactants for the catalytic reaction are supplied to several reactors and the product stream exiting the reactors is separately analyzed for each individual reactor.

Claim 12. (Previously presented)

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The method according to claim 11,

wherein the catalytic reaction is performed by series-connecting or arraying 5 to 1,000 reactors comprised of spaces with catalytically active material,

wherein the diameter of these spaces is 100 μm to 10 mm and the lengths are 1 mm to 100 mm.

Claim 13. (Previously presented)

The method according to claim 11,

wherein the throughput of reactants is selected for a preset reactor length in such a way as to achieve the desired degree of conversion.

Claim 14. (Previously presented)

The method according to claim 11,

wherein the reactor is a monolithic block with several parallel channels, which can be closed selectively at the inlet or outlet side individually or in larger number even during the catalytic reaction, or a porous module having channels extending preferably parallel to the flow direction of the reaction mixture, whose channels can be closed at the inlet or outlet side individually or in a large number even during the catalytic reaction.

Claim 15. (Previously presented)

The method according to claim 19,

wherein the reactants for the catalytic reaction are supplied to the reactors, and wherein the composition of the product streams exiting the reactors is analyzed by a measuring sensor, wherein the measuring sensor is guided two-dimensionally across the exit cross-section of all reactors or the reactors are moved two-dimensionally relative to the measuring sensor and the portion of the product streams received by the measuring sensor is supplied to the analytical device.

Claim 16. (Cancelled)

Claim 17. (Cancelled)

Claim 18. (Cancelled)

Claim 19. (Currently amended)

A method for developing solid catalysts for a heterogenous catalytic reaction comprising the steps of:

(a1) preparing a substance library of individual catalytic materials a first generation of catalysts having a number n₁ of solid catalysts from a substance library of catalytic materials by selecting and introducing catalytic materials into thea substance library, which have already been described or are known

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or have been determined ~~empirically or~~ intuitively for an individual reaction step of the heterogeneous catalytic reaction under consideration;

(a2) preparing and producing a first generation of catalysts having a number n_1 of solid catalysts from the substance library of catalytic materials ~~wherein~~ by ~~a~~ random~~ly~~ selecting~~on~~ arbitrary mixtures from the ~~elements~~ materials of the substance library, ~~are produced and~~ wherein the catalysts ~~are in the form of~~ compounds ~~of~~ meet the formula (I)

$$\left(A^1_{a_1}..A^i_{a_i}\right)-\left(B^1_{b_1}..B^j_{b_j}\right)-\left(D^1_{d_1}..D^k_{d_k}\right)-\left(T^1_{t_1}..T^l_{t_l}\right)-O_p \,(\text{I})$$

wherein $A^1 .. A^i$ is a number i of different main components which are selected from the elements of the PTE, excluding trans uranium and noble gas elements, and the number i is between 1 and 10,

$B^1 .. B^j$ is a number j of different minor components selected from the group of the elements Li, Na, K, Mg, Ca, Sr, Ba, Y, La, Ti, Zr, V, Nb, Cr, Mn, Tc, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, B, Al, Ga, In, C, Si, Sn, Pb, N, P, As, Sb, Bi, S, Se, Te, F, Cl, Ce and Nd, and the number j is between 1 and 10,

$D^1 .. D^k$ is a quantity k of different doping elements selected from the group of the elements Li, Na, Ka, Mg, Ca, Sr, Ba, Y, La, Ti, Zr, V, Nb, Cr, Mn, Tc, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu,

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Ag, Au, Zn, Cd, Hg, B, Al, Ga, In, Si, Sn, Pb, N, P, As, Sb, Bi, S,

Se, Te, F, Cl, Ce and Nd and the number k is between 1 and 10,

$T^1 .. T^l$ is a number l of different support components which are

comprised of oxides, carbonates, carbides, nitrides, borides of the

elements Mg, Ca, Sr, Ba, La, Zr, Ce, Al, Si or a mixed phase of two

or more thereof, and the number l is between 1 and 10, and O is

oxygen, $a_1..a_i$ are identical or different mole fractions of 0 to 100

mole-% with the provision that the mole fractions

$a_1..a_i$ cannot all be 0 at the same time,

$b_1 .. b_j$ are mole fractions of 0 to 90 mole-%,

$d_1 .. d_k$ are mole fractions of 0 to 10 mole-%,

$t_1 .. t_l$ are mole fractions of 0 to 99.99 mole-%,

p is a mole fraction of 0 to 75 mole-%, wherein the sum of all mole

fractions

$a_i + b_j + d_k + t_l$ may be not greater than 100 %, and

the number n_1 of catalysts with different quantitative

composition or different chemical composition or different weight

and chemical compositions is in the range of 5 to 100,000; and

(a3) determining the fitness of the catalysts experimentally

according to the activity or selectivity or activity and

selectivity of the 1st generation catalysts for a given catalytic

reaction in a reactor or in several series connected reactors;

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(b) selecting a number y_{n+1} of catalysts of nth generation according to the highest activities for a catalytic reaction or the highest selectivities for the desired product and product mixture or the highest activity and selectivity of all 1st to n^{th} generation solid catalysts, wherein the number y_{n+1} is 1 to 50 % of the number n_n, where n is finite;

(c) preparing a n_{n+1}-th generation of solid catalysts from the selected y_{n+1} catalysts, wherein n_{n+1} new catalysts of the general formula (I) with A, B, D, T, a, b, d and t and p as defined under (a) are generated by~~:~~ <u>performing the following steps for at least one of the group of components A, B, D, T:</u>

randomly selecting at least two respective catalysts from the number y_{n+1} of catalysts~~, wherein all catalysts have the same probability $W_{cat} = (y_{n+1})^{-1} \cdot 100\%$ of selection~~, and <u>then</u>

<u>randomly</u> selecting at least one component of <u>each of</u> the selected at least two catalysts, respectively, ~~wherein each catalysts component A^t, B^t, D^x and T^t has the same probability of selection $W_A = (i \cdot y_{n+1})^{-t} \cdot 100\%$, $W_B = (j \cdot y_{n+1})^{-t} \cdot 100\%$, $W_D = (k \cdot y_{n+1})^{-t} \cdot 100\%$, $W_T = (l \cdot y_{n+1})^{-t} \cdot 100\%$ as every other component from the same group of catalyst components, respectively~~; and

performing at least one of the steps of:

exchanging the selected components between the selected at least two respective catalysts to form new catalysts, and<u>/or</u>

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randomly varying a substance amount a_i, b_j, d_k and t_l of a catalyst

component A^i, B^j, D^k and T^l, which is randomly selected, ~~wherein~~

~~each catalysts component has the same probability of selection~~

~~$W_A = (i \cdot y_{n+1})^{-t} \cdot 100\%$, $W_B = (j \cdot y_{n+1})^{-t} \cdot 100\%$, $W_D = (k \cdot y_{n+1})^{-t} \cdot 100\%$, $W_T = (l \cdot y_{n+1})^{-t} \cdot 100\%$~~

~~as every other component from the same group of catalyst~~

~~components, respectively,~~ for at least one of the selected

catalysts by determining new values for the corresponding mole

fractions within the limits defined under (a);

(d)   determining a fitness of the catalysts experimentally by

measuring the activity or selectivity or activity and selectivity

of the $(n+1)^{th}$ generation of catalysts for a given catalytic

reaction in a reactor or in several series connected reactors;

(e)   performing the selection of catalysts according to step

(c), the preparation of a new catalyst generation according to

step (d), and the determination of a fitness function according

to step (e) until a catalyst generation is obtained, for which

the fitness compared to the preceding generations is either not

increased, or no longer significantly increased as an arithmetic

mean.

Claim 20.(Cancelled)

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